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Tests of Roof Heel Joints

Architectural Engineering

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Arturo V. Gonzalez

ENTITLED TESTS OF ROOF HEEL JOINTS

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF Bachelor of Science in Architectural Engineering

N. Clifford Ricker
Instructor in Charge.

APPROVED: N. Clifford Ricker.

HEAD OF DEPARTMENT OF Architecture

TESTS
OF
ROOF HEEL JOINTS

BY

ARTURO V. GONZALEZ

THESIS

FOR

DEGREE OF BACHELOR OF SCIENCE

IN

ARCHITECTURAL ENGINEERING

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

PRESENTED JUNE, 1907

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Character and General Description of Work.

The aim in this work is to investigate some of the principles which should really govern the design and construction of wooden roof trusses.

A series of tests conducted on the heel joints of a truss would, undoubtedly, be of great value in this case, as these are the joints upon which mainly depends the stability of a truss.

Although when we design a roof truss we assume certain coefficients of safety for the wood and other materials used for the construction of such a truss; yet when the truss is on place we do not know if the same coefficients of safety still exist in the whole structure; whether it has diminished or increased due to the kind of construction or some other reasons.

The strength of a truss, undoubtedly, depends first upon the material used for its construction, and second, upon the way or manner ~~how~~ the different members are connected. Assuming that the units used for wood, cast iron, and steel (which are the materials here used for the construction of the trusses) are the true units, I proceed to determine the influence that the different kinds of joints have upon the trusses.

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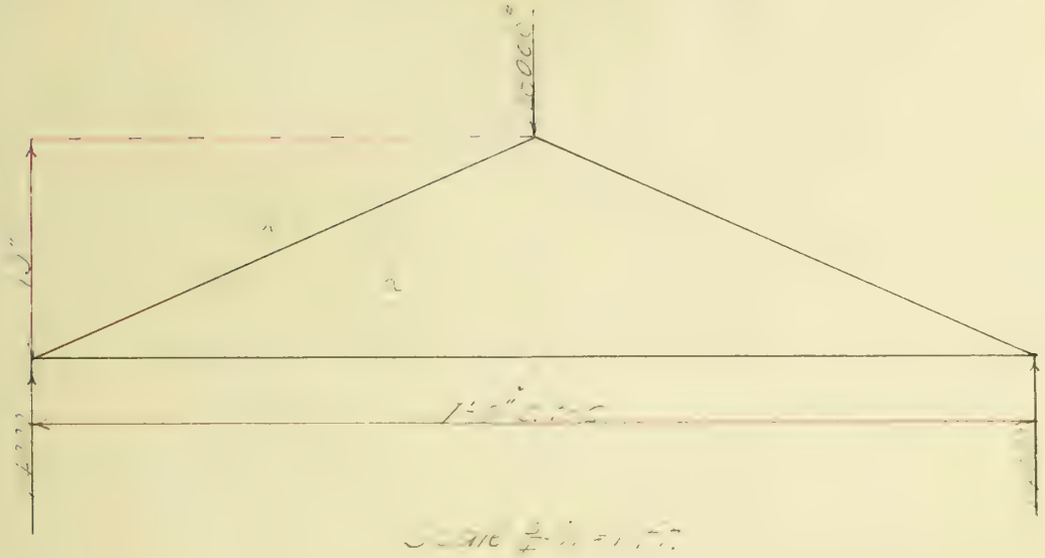

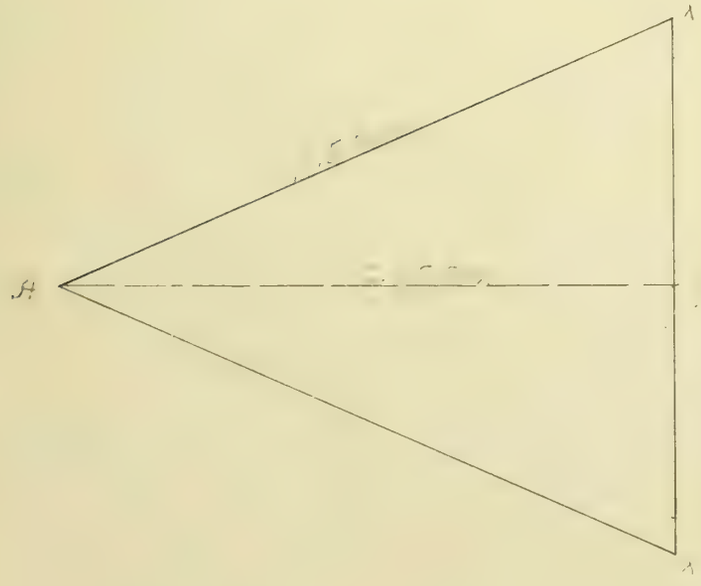

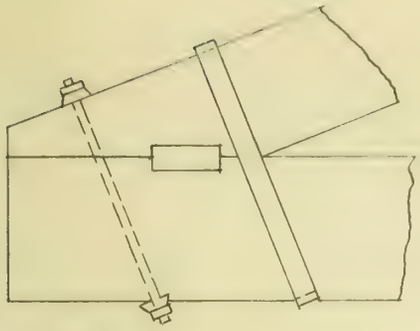

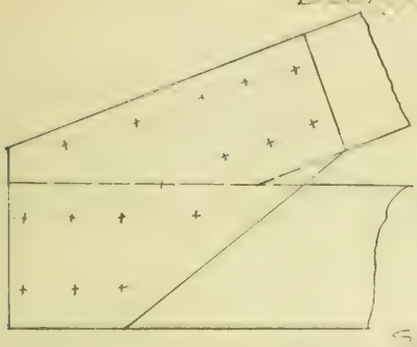

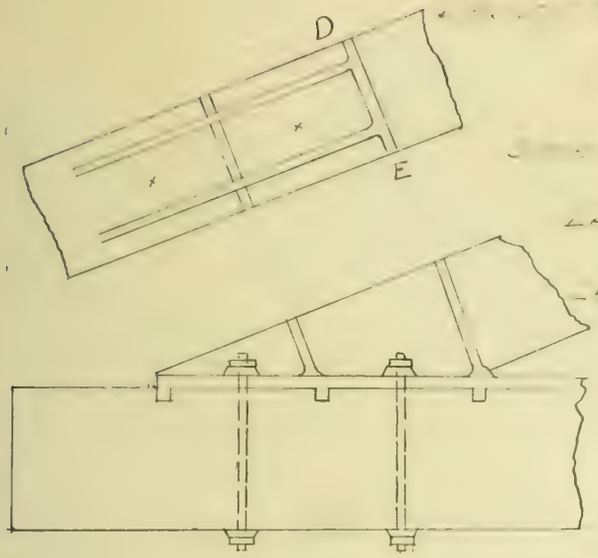
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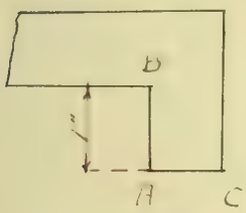
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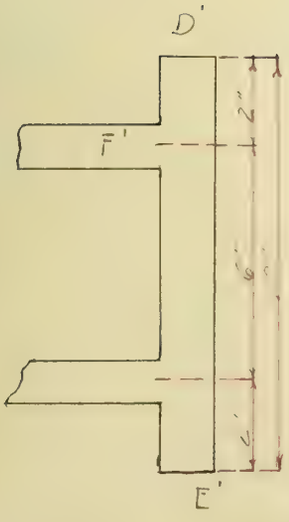
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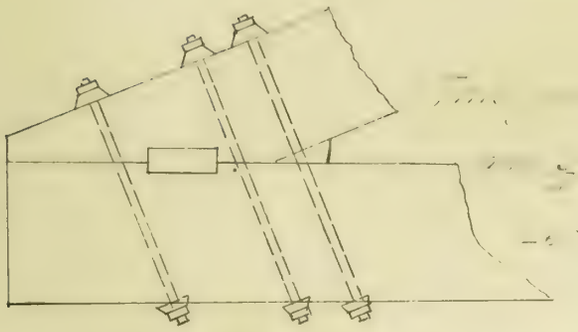

No. 1

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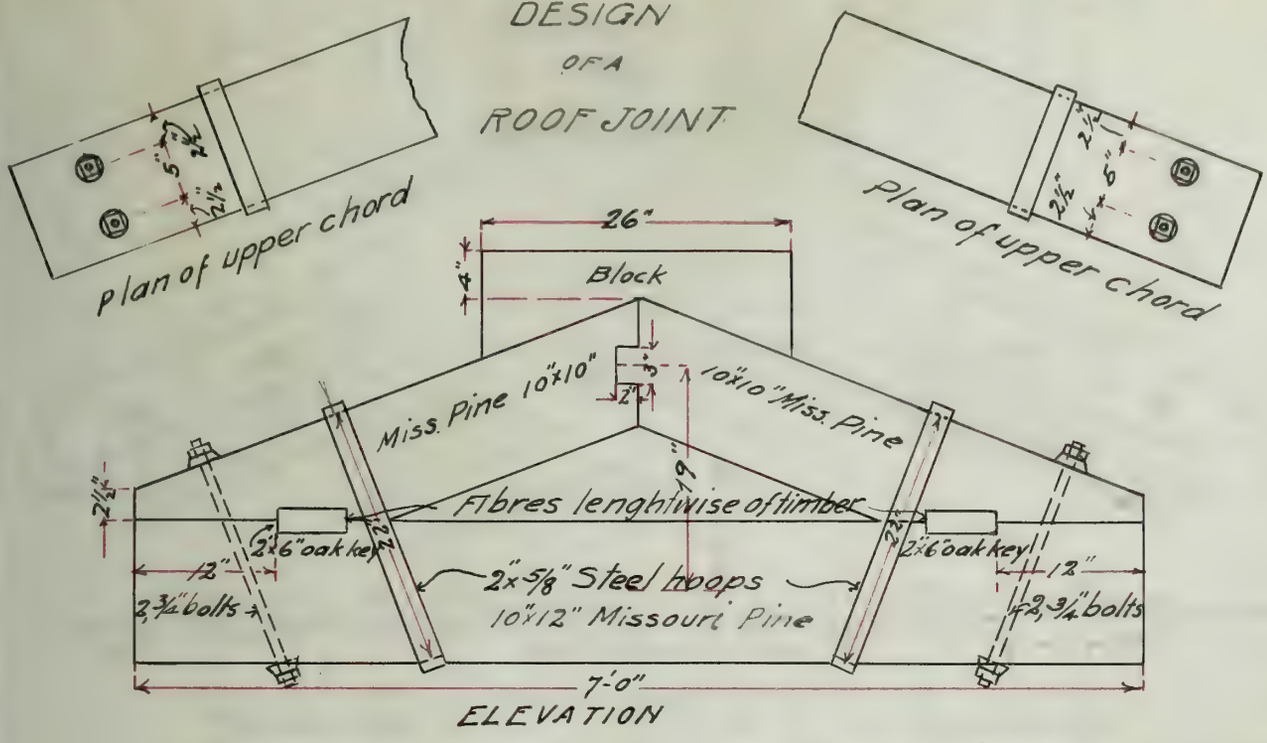

ELEVATION

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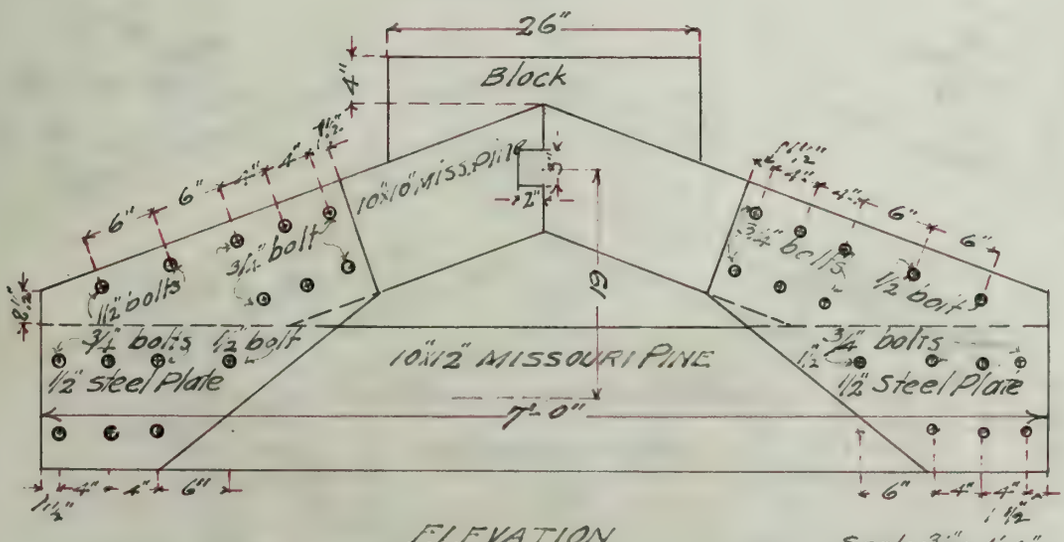

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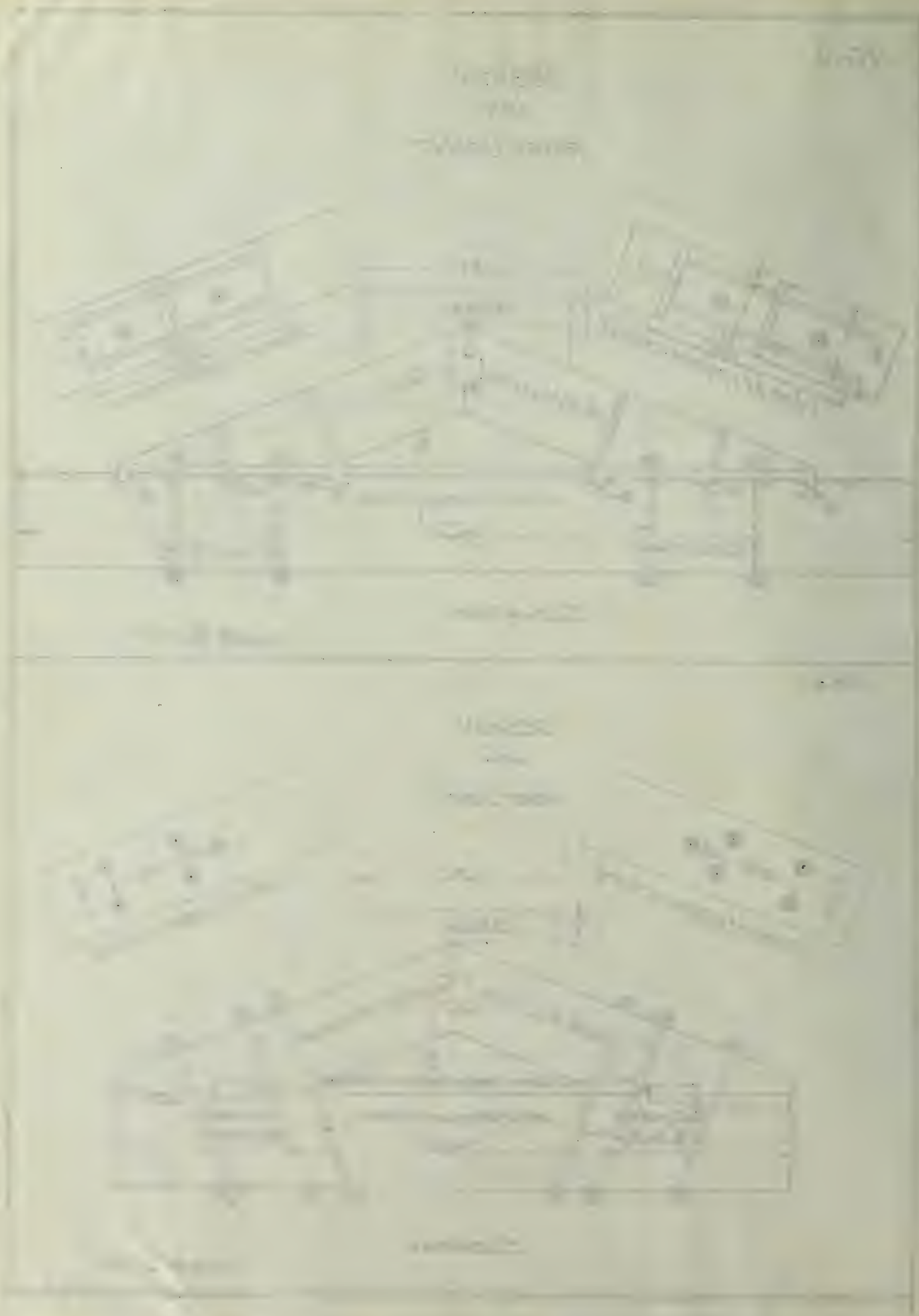

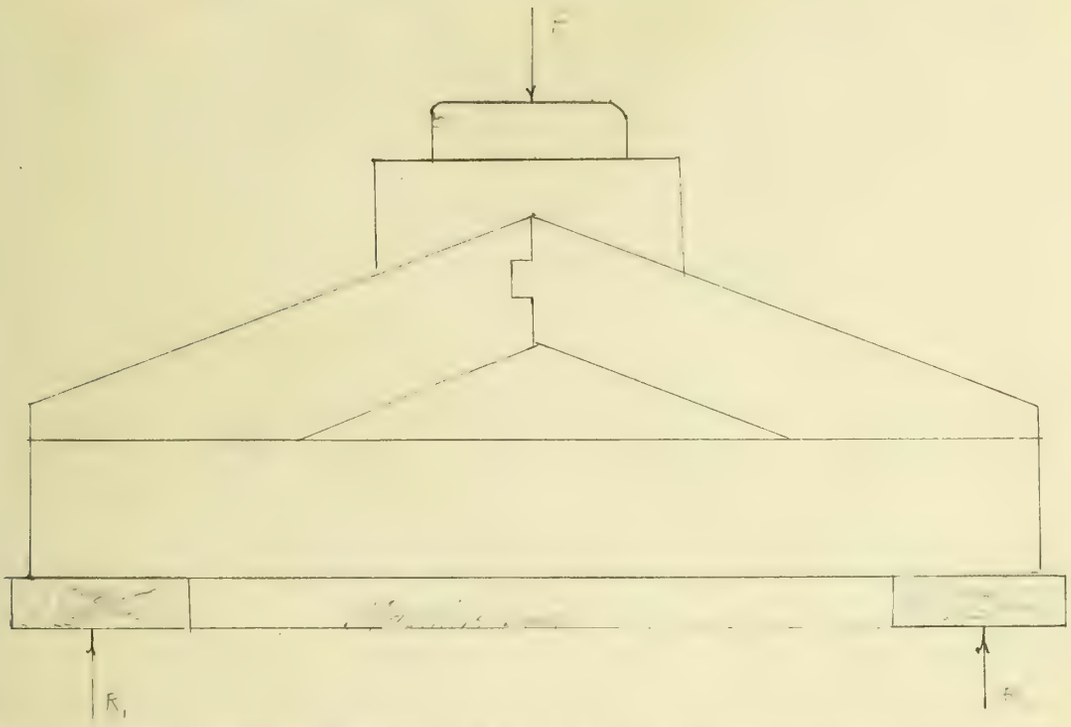
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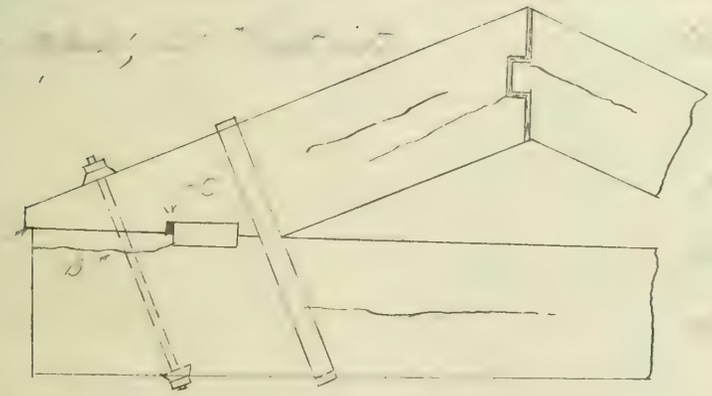
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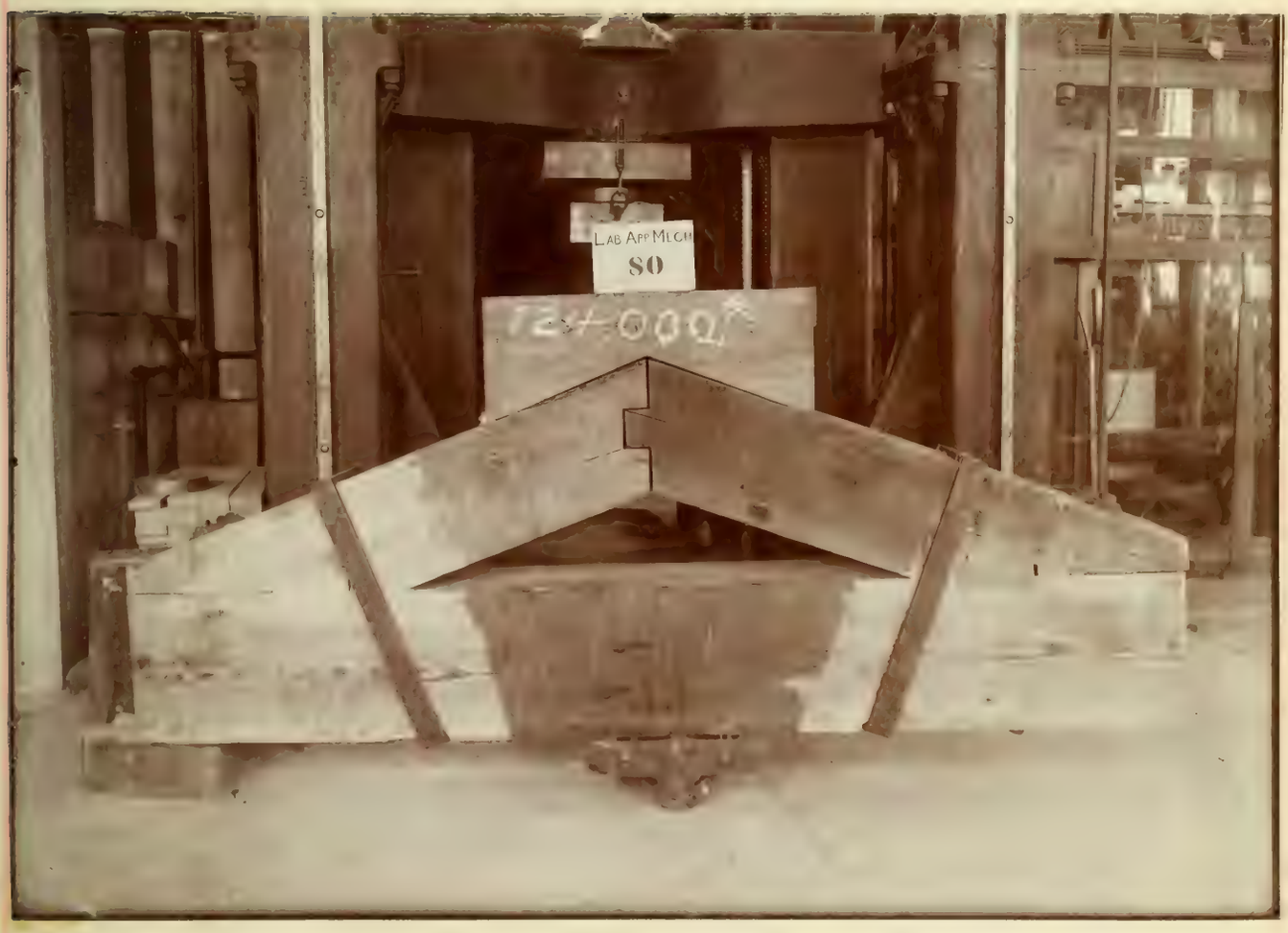

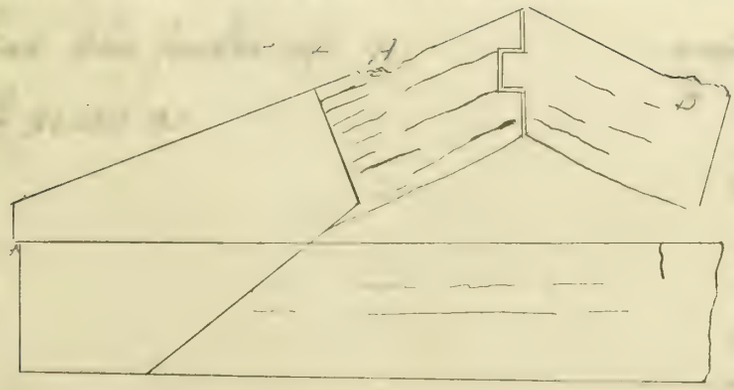

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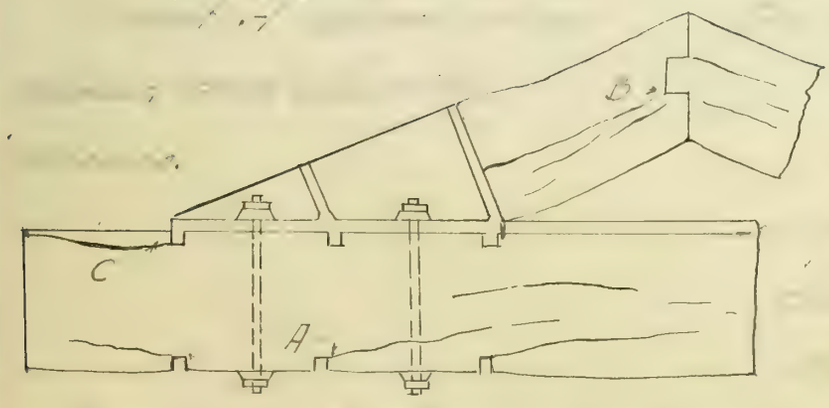
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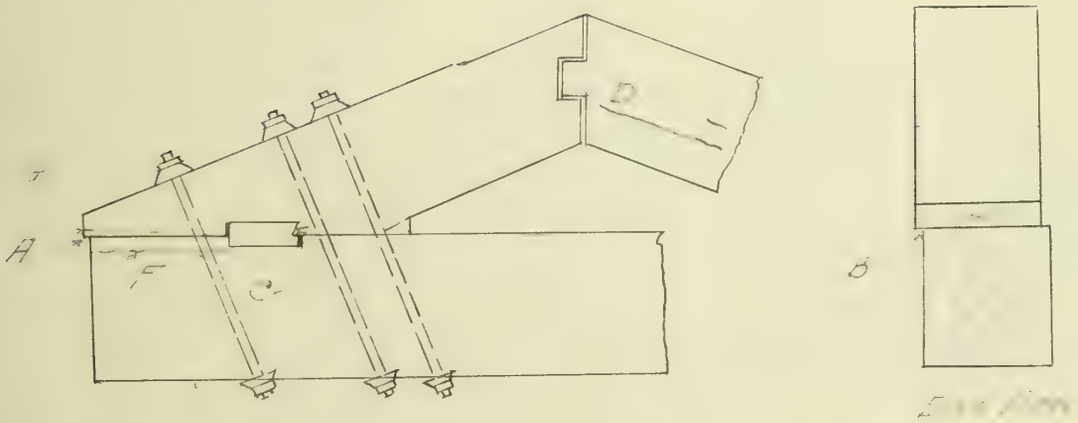
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Conclusion

The results of the experiments conducted on these roof heel joints show that any of the tested joints is safe enough for practical purposes, since the factors of safety range from 4 to 7; that the relative efficiency of the mentioned trusses mainly depends upon the kind of joint; in one case, only, the upper chord failed before the joint gave away or showed any perceptible signs of failure - The tests show also that the assumptions made in the design of the joints (for the unit stresses used) are somewhat concordant with the final results, which show the factors of safety of the trusses; that none of the mentioned joints showed any signs of failure when the load for which they were designed was reached; that the joint made out of steel plates was the strongest; the joint formed of a cast iron shoe was next in strength; the one formed of 5-$\frac{3}{4}$-inch bolts was the next; and the one made out of a steel hoop and 2-$\frac{3}{4}$ inch bolts, was the poorest kind of joint.

I scarcely think that the testing of one specimen of each kind of joint will be enough to conclude much about the strength of each joint; but it certainly gives us very good comparison of the several types which were tested.